

National Weather Service Summer 2012 Outlook

For Southwest Lower Michigan

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Forecast Overview

The official National Weather Service long range **temperature** forecast (CPC) for Southwest Lower Michigan (Fig.1), for the period from June through August, indicates there is a 33% chance temperature to be above normal category, a 34% chance for it to be in the near normal category and 33% chance for it to be in the below normal category.

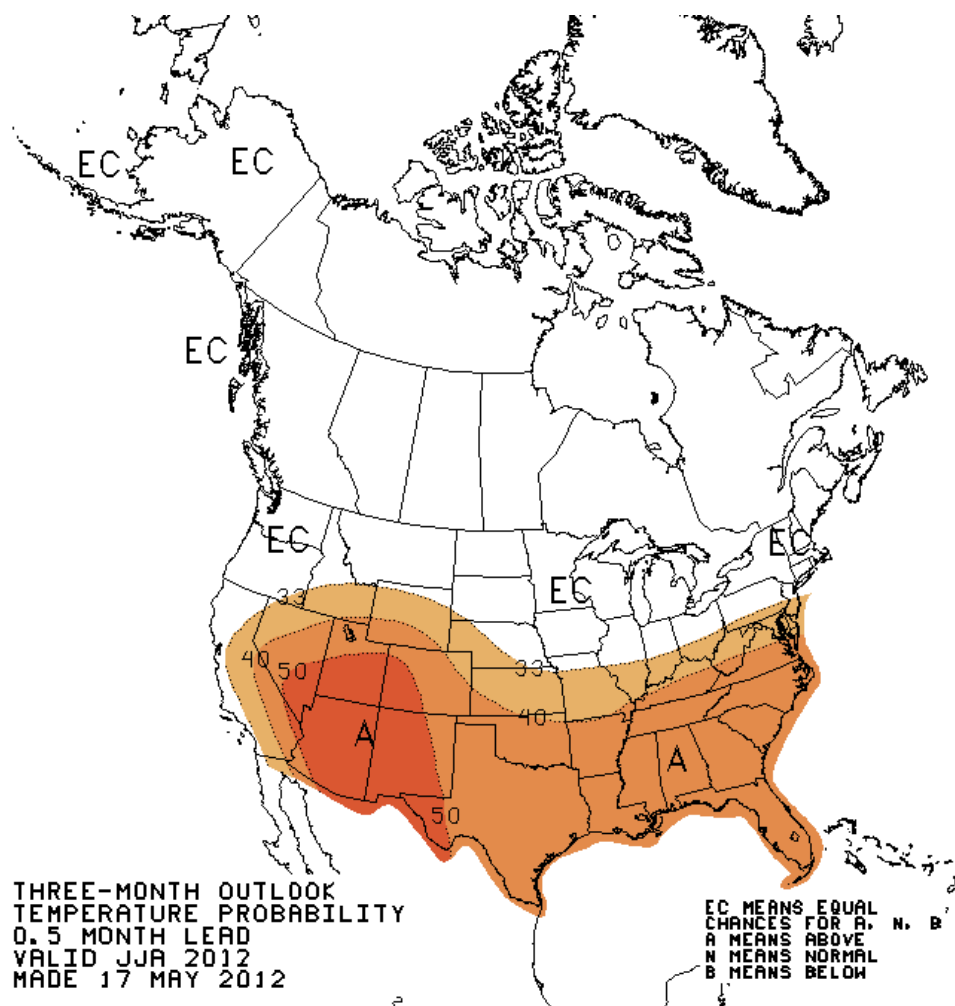


Fig. 1. The CPC temperature forecast June through August 2012 temperature anomaly.

The official National Weather Service long range **precipitation** forecast (CPC) for Southwest Lower Michigan (Fig.2), for the period from June through August, indicates there is a 33% chance for the precipitation to be in the above normal category, a 34% chance for it to be in the near normal category and a 33% chance for it to be in the below normal category.

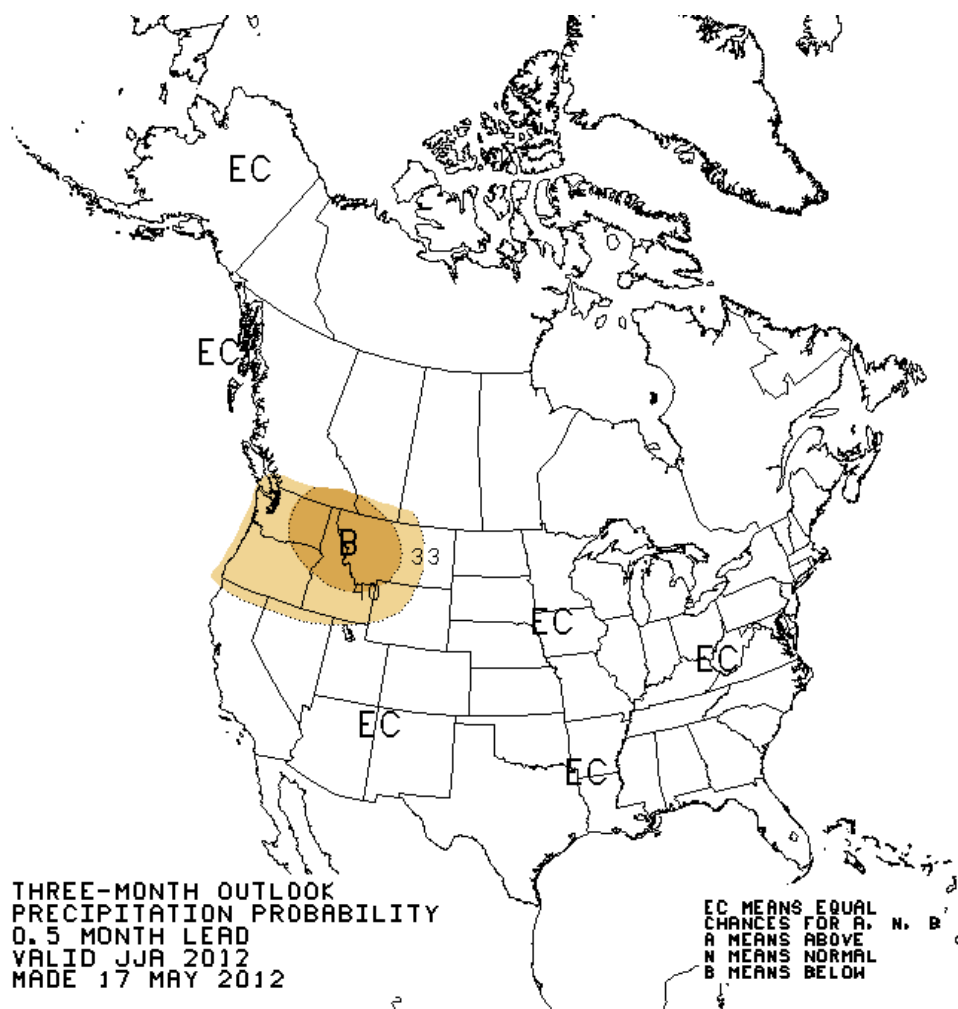


Fig. 2. The CPC precipitation probability forecast for summer (June-August 2012)

Normals

Normal temperatures are calculated averages from the 30-year period of record from 1981 to 2010. Table 1 lists normal values of temperature and precipitation for the summer months of July through September for Grand Rapids, Lansing, and Muskegon.

TABLE 1. The normal's listed below are for June through August and are based on the years 1981 to 2010. All temperatures are in degrees Fahrenheit.

	Grand Rapids	Muskegon	Lansing
Average High Temperature	81	78	80
Average Low Temperature	60	60	59
Mean Temperature	71	69	70
# of days with High above 89 F	8.4	1.8	7.0
Precipitation (inches)	11.14	8.31	9.52

Forecast Reasoning

The forecast for this summer is primary based on the interaction of ENSO with the polar jet stream, whose dominant position affects the weather patterns over Southwest Lower Michigan. Beside the ENSO factor, the persistence of seasonal trends is strongly considered in these forecasts as was the dynamical models and soil moisture anomalies. This summer is a special case in that ENSO is going from a winter La Nina to neutral for the early summer and may become a weak El Nino by late summer or early fall.

Temperature

A weak La Niña prevailed through the winter months of 2012, but as of mid-May, ENSO has become neutral. Typically 60% summers in Southwest Michigan are cooler than normal when La

Niña winter proceeds to neutral or an El Niño (Table 2) by the summer. For this scenario, as far as our records go back, there has NEVER been a warmer than normal summer.

The suggestion of cold summer, based on the La Niña to neutral or El Niño concept is mitigated by the persistence of warm temperatures from the winter through the spring. For years when both the winter and spring remained warmer than normal, as it has this year, the summer that followed was warmer than normal 50% of the time. Only 10% of those summers were colder than normal.

Another mitigation of the cold summer idea comes from the persistence of a positive Arctic Oscillation (AO). That has prevailed through the winter and spring. Typically if the AO remains positive during the summer, anomalously warm temperatures prevailed through the summer (Table 2) 41% of the time. Cold summers occurred only 27% of the time.

The various climate models run by CPC show the temperature to be near normal this summer over Michigan. These models have skill mask, which means a forecast is only shown for a particular area when the model has shown statistical skill over that area. For Southwest Lower Michigan the forecast was shown, meaning it has statistical skill.

Factoring all this together the various scenarios and model forecasts cancel each other. Therefore the EC forecast seems best for this summer over Southwest Lower Michigan. That is there is an equal chance for above normal, near normal or below normal temperatures.

TABLE 2. The outcomes for Southwest Lower Michigan for various summer weather regimes.

Summer Temperature Outcome in Southwest Michigan			
Temperature Anomaly	La Nina to Neutral	Warm Winter/Springs	Positive AO
Cold Rules	60%	10%	27%
Warm Rules	0%	50%	41%
Near Normal	40%	30%	32%

Precipitation

The winter La Nina to neutral for the early summer and may become a weak El Nino by late summer or early fall scenario for precipitation results in mixed results (Table 3). There seems to be no clear preferred outcome. Near normal seems to have the highest frequency.

With the AO spin, if there were a negative AO a wet summer seems the most likely to prevail with a 50% frequency. Dry summers happen only 13% of the time. On the other hand if the AO were to stay positive the dry summer outcome seems to prevail.

The various climate models used by CPC all show either no skill over Michigan or if skill is shown for the summer precipitation forecast over Southwest Lower Michigan the outcome is near normal.

Putting this together we are once again put in the EC category. That is there is an equal chance of for the above normal, near normal or below normal outcomes.

TABLE 3. Composite analysis for spring and summer precipitation for Southwest Lower Michigan based on a moderate La Nina during the winter fading to neutral by mid-summer.

Summer Precipitation Outcome			
Temperature Anomaly	La Nina to Neutral	Negative AO	Positive AO
Wet Summer	30%	50%	7%
Normal	40%	38%	40%
Dry Summer	20%	13%	53%

Summary

When all of these influences are considered together for Southwest Lower Michigan, the result is a preference for temperatures in the spring and summer to near the normal distribution. Precipitation should be on the wet side of normal in the spring and on the dry side of normal for the summer..

USEFUL WEB LINKS ON LONG RANGE FORECASTING:

Three month downscaled outlooks for selected cities in Southwest Lower Michigan:

http://www.weather.gov/climate/calendar_outlook.php?wfo=grr

The Climate Prediction Center's (CPC's) forecast:

<http://www.cpc.ncep.noaa.gov/products/predictions/90day/>

Additional information about past and current climate conditions:

<http://www.cpc.ncep.noaa.gov/products/predictions/90day/tools/briefing/>

Other CPC forecasts:

<http://www.cpc.ncep.noaa.gov/products/predictions/>

CPC's ENSO page:

http://www.cpc.ncep.noaa.gov/products/analysis_monitoring/enso_advisory/

Additional ENSO information:

http://www.pmel.noaa.gov/tao/el_nino/nino-home.html

Information on the PDO:

<http://www.wrh.noaa.gov/fgz/science/pdo.php>

Information on what the AMO:

http://www.aoml.noaa.gov/phod/amo_faq.php

Persistent Patterns that Shape Weather and Climate Variability- a glossary for them:

<http://www.ucar.edu/news/backgrounders/patterns.shtml>